The Interactive Effects of Home Ownership and Housing Prices on Asset Allocations

Honors Undergraduate Research Thesis

Presented in Partial Fulfillment of the Requirements for the Business Administration Degree with Honors Research Distinction in the Max M. Fisher College of Business at The Ohio State University

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I. ABSTRACT

Finding the optimal portfolio construction has in recent years been a trendy topic among institutional and individual investors. Since the housing bubble of 2007, researchers have paid more attention to the relationship of housing markets and the financial world to take advantage of how these relationships affect investment decisions. Many relevant researches led to an important question that this research is trying to investigate: when housing prices move, how investors with different housing status make asset allocation decisions?

By incorporating housing-related data as well as non-financial factors such as age, sex, income level, among other controls, this research builds multivariate regression models to forecast three types of information of investors regarding asset allocation: asset participation probability, holding values, and the percentage of each asset class. Initial results show that when housing prices increase, both homeowners and home renters are less likely to participate in risky assets, such as stocks, certificate of deposits, and Bond. Homeowners and home renters also have different investment behaviors concerning changing the holding values of all five key asset classes: Checking, Savings, Stocks, Certificates of Deposits, and Bond. Moreover, homeowners and home renters have different strategies of asset allocation percentages only for Stocks and Certificates of Deposits. Such analyses and models will provide an innovative framework to quantify non-financial factors from the behavioral finance standpoint and enable institutions to forecast the overall financial market trends.

II. KEYWORDS

HOUSING PRICES, HOME OWNERSHIP, ASSET ALLOCATION

III. ACKNOWLEDGMENTS

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Also, I would like to thank the Honors Contract Program for providing me the research experience to apply my coursework to a real-world problem and find my true interests in financial modeling.

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VI. INTRODUCTION

Traditional researchers and investors believe that the overall financial markets are rational, and investors make asset allocation decisions only based on investment goals, time frame, risk-averse level, etc. However, previous researchers have shown that both macro-level factors, such as economic conditions and unemployment rates, and micro-level family characteristics have huge impacts on investors' asset allocation decisions. The relationships between the financial markets and all other variables just mentioned above make it very difficult to predict an investor's behaviors.

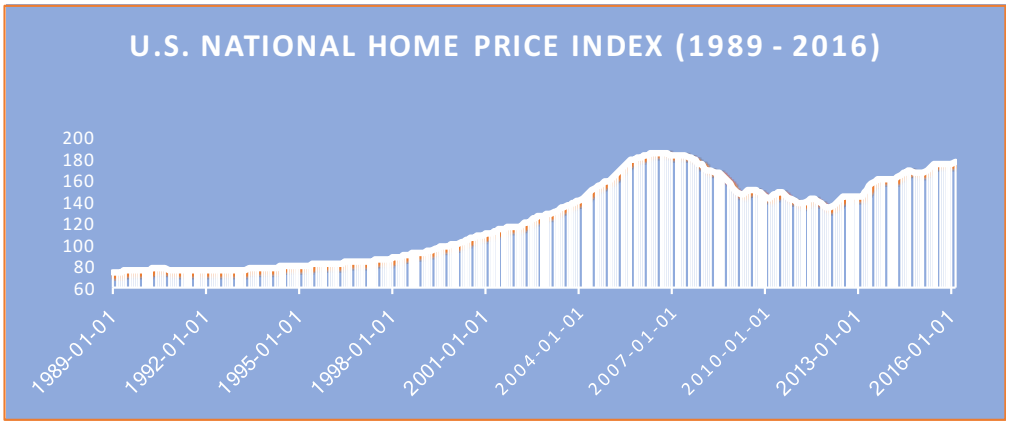

Figure I: U.S. National Home Price Index (1989 - 2016)

For most of the investors, housing is one of the largest and the most important assets among all the financial and non-financial products. During the last twenty-seven years as shown in Figure I, housing markets in the United States have experienced dramatic moves. From 1989 to 2004, the national-level home price index doubled and then reached its all-time high in July 2006. Shortly after its all-time high, the national home price index dropped dramatically during the housing bubble in 2007. These huge fluctuations have different potential impacts on homeowners and home renters. When home price index increases, the total assets of homeowners will also increase to

provide more investment options for homeowners. At the same time, home renters will potentially pay higher rents, and decrease the total disposable income for other investments.

The trends in the financial and the housing markets, as well as the relationship between these two, lead to the development of this research: when the housing markets move, how homeowners and home renters behave differently regarding their asset allocation decisions? In other words, this research will explore and test whether the differences in investment behaviors between homeowners and home renters are statistically significant. The results of this research will explain the interactive effects of housing prices and home ownership on assets allocation, provide new variables for the traditional asset allocation models, and also provide a unique perspective for the government and institutional investors to better forecast movements in the financial markets given the information of the housing markets.

This research will also include the following chapters. Chapter VII will discuss some previous studies and existing researches related to this research question, which is the relationship between asset allocation decisions and housing-related information. Chapter VIII will talk about the hypotheses about the expected different behaviors of homeowners and home renters. Chapter IX will describe the datasets and newly created variables for the data analysis as well as the methods to test my hypotheses. Chapter X will show the statistical results of my research question. Besides, Chapter XI will further discuss the limitations of this research and methods for possible further study.

VII. LITERATURE REVIEW

Previous research papers have proved the fact that housing prices, house ownership, and asset allocations are interrelated. Specifically, houses play an important role in driving investors' financial decisions since houses account for a huge portion of investors' overall asset values. However, most of the papers only took two variables into considerations and never look for the interaction of housing prices and home ownership. For example, Corradin, Fillat, and Vergara-Alert (2014) found the relationships between shares of risky assets and housing prices. In other words, the percentage of wealth invested in risky assets is lower during periods of high expected growth in house prices. The decrease in risky portfolio holdings for households moving to a more expensive house is more significant in high-growth periods. From asset allocations to a more general idea of risk-taking, Liao, Zhao, and Sing (2014) found a significant negative relationship between the housing wealth effect and households' risk attitudes towards asset allocations. Households, who are less risk-averse, experience greater consumption changes in response to house price appreciation. These two papers showed the facts that investors make different asset allocation decisions when faced with the fluctuations of housing prices.

At the same time, people cannot ignore the fact that for any household, houses are a big part of the total assets including financial and non-financial. Therefore, many research papers also measured the housing effect on asset and portfolio constructions, which means that investment in housing has a great impact on holdings of other financial assets, such as stocks and bonds. Cocco (2005) found that investment in housing plays a crucial role in explaining the patterns of cross-sectional variation in the composition of wealth and the level of stockholdings observed in portfolio composition data. Furthermore, due to investments in housing, younger and poorer investors have limited financial wealth to invest in stocks. This fact reduces the benefits of equity market

participation for specific types of investors. Qolizadeh and Matin (2011) found that housing is an important asset in the portfolio during the housing boom period and causes the efficient frontier transmission to move outwards. Based on two pieces of researches just mentioned above, the housing itself has a limitation as well as diversification effects on asset allocations.

In addition, previous researchers also compared holding values of different asset classes among home-renters and home-owners, which proved that home-ownership is correlated with asset selections and makes a significant impact on investors' moves. Hu (2004) found that homeowners facing more non-diversified and levered risks in housing will invest their liquid assets more conservatively than those who have relatively less housing, while renters are more risk averse in asset allocations when they expect to purchase a house shortly.

All these research papers discussed above showed the relationships between two variables among housing prices, house ownership, and asset allocations. They all have laid a solid foundation for this research paper, which links all three variables together and incorporates more non-financial factors into models that predict investors' asset allocation decisions.

VIII. HYPOTHESIS

The primary focus of this research is to investigate different investment behaviors of homeowners and homer renters when they face fluctuations of housing prices. With crucial information of home ownership, housing price index (HPI), as well as individual characteristics, this research will create models to predict future asset allocation decisions made by investors. This research seeks to answer the following questions:

As Home Price Index increases, how do homeowners and home renters behave differently regarding asset allocation decisions?

- More specifically, which financial products would homeowners and home renters like to hold?
- How do homeowners and home renters adjust asset holding values?
- How do homeowners and home renters change the percentage of each asset class?

Previous literature reviews and the questions above lead to the following hypotheses:

Hypothesis I: Increasing home price index has different effects on homeowners and home renters regarding participation probability of financial products.

Hypothesis II: For investors with certain types of financial products, increasing home price index has different effects on homeowners and home renters regarding changing holding values of the financial products.

Hypothesis III: Increasing home price index has different effects on homeowners and home renters regarding changing the percentages of each financial product.

IX. DATA DESCRIPTION AND METHODOLOGY

A. Data Description

In this research, two main datasets are used, including one dataset for household asset allocations information and one for housing prices, to investigate the interactive impacts of housing prices and home-ownership on asset allocations during the last almost thirty years in the United States.

(1) ***Survey of Consumer Finances*** (from 1989 to 2016): as the primary data source for assets allocation information, the Survey of Consumer Finances is conducted every three years to reflect investors' background and financial holdings. Ten surveys are included in this research, and each dataset contains detailed information of more than three thousand survey participants. Key family characteristics variables included for this research are individual's age, sex, number of kids, educational level, home-ownership status, occupation type, labor force status, and income. The Survey of Consumer Finances also has information about individual's assets allocations information, which includes whether or not an individual has a specific asset class and the holding value of this asset. Five asset classes are included in this research, and they are Checking, Savings, Certificates of Deposit, Stocks, and Bond.

(2) ***S&P/Case-Shiller U.S. National Home Price Index (***from January 1989 to January 2016): this is the dataset for home price index information. Combining this dataset with the Survey of Consumer Finances, this research assigns the housing price index of January in each survey year to every respondent in the Survey of Consumer Finances as a corresponding housing price index.

B. Data Cleaning and smoothing

Before doing data analysis and running regressions, this research removed all survey participants in the Survey of Consumer Finances whose yearly income is greater than 20 million to decrease the effects of outliers. This research also takes the natural log of investors' annual income as a new variable called IncomeLn to avoid the harmful consequences of outliers.

C. New Variables

(1) LnIncome: this research calculated the Natural Log of annual income for each survey respondent in the Survey of Consumer Finances, and a new variable LnIncome is created.

(2) Ln(Holding Values): this research created five new variables to reflect the holding values of five asset classes, and these variables are LnChecking, LnSavings, LnStocks, LnCDS, LnBond.

(3) Allocation Percentage: this research calculated the percentage of each asset class among all five key asset classes. For example, PerChecking = Checking / (Checking + Savings + Stocks + CDs + Bond).

(4) HouInt: this research created a new variable called ***HouInt*** to measure the different impact of housing prices on homeowners relative to home-renters. This new variable ***HouInt*** equals to Housing Prices Index * House Ownership (1 for homeowners, 0 for home renters).

D. Methodology

This research mainly uses multivariate regressions to explain the interactive effects of housing prices and home ownership on asset allocations while controlling the impact of non-financial factors on financial decisions. This research uses three variables to measure asset allocation decisions of each investor: participation probability, holding values, and the allocation percentage of each key asset class. This research has in total fifteen regression models to show three different variables of each of the five target asset classes.

The most critical variables are HPI and HouInt. The coefficients of HPI explain the impact of HPI on asset allocation decisions for home renters. Adding the coefficients of HPI and HouInt provides the impact of HPI on asset allocation decisions of homeowners. If HouInt has significance levels (p-value less than 0.05), it means that homeowners and home renters have different investment behaviors when they face with housing prices fluctuations.

X. DATA ANALYSIS AND RESULTS

A. Predicting the probability of having one specific asset class

This research conducted five multivariate regressions for predicting an individual's probability of having one of the five asset classes. The following chart shows coefficients of HPI and HPI+HouInt, which measures the impact of housing prices on home-renters (red bars) and homeowners (blue bars). When housing price increases, both homeowners and home renters are more likely to participate in checking and savings account while decreases the participation probabilities of having stocks, certificate of deposits, and Bond. HouInt is significant for Checking, Savings, Stocks, and CDs. In other words, homeowners and home renters behave differently when home price index increases even if homeowners and home renters move in the same direction.

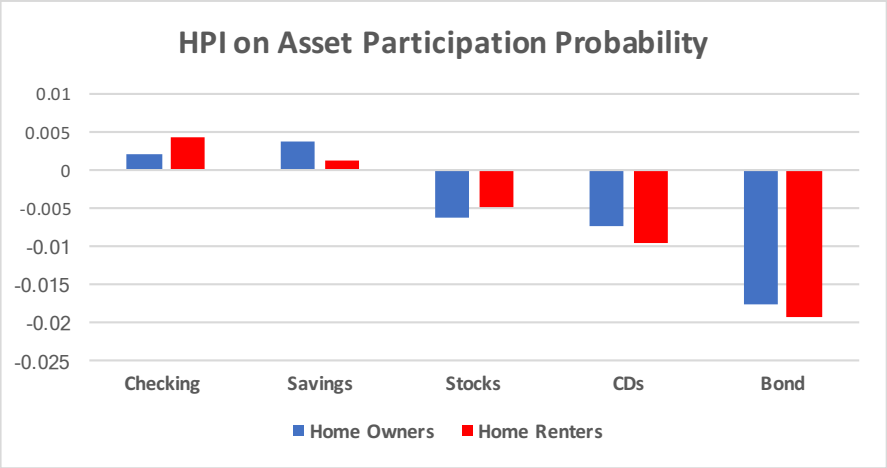

Figure 2:

Coefficients of HPI on asset participation probability for homeowners and home renters

B. Predicting the holding value of one specific asset class

This research conducts five multivariate regressions for predicting the holding value of one specific asset class given that an investor holds this specific asset class. The following chart also shows the coefficients of HPI and HPI+HouInt, which measures the impact of housing prices on

home-renters (red bars) and homeowners (blue bars). When housing price increases, homeowners tend to increase the holding values of Checking, Savings, Stocks, and CDs while only deceasing the holding values of Bond. Home renters are more likely to increase the holding values of Checking and Bond and decrease the holding values of Savings, Stocks, and Bond. HouInt is significant for all of the five key assets. In other words, homeowners and home renters change holding values of each asset class differently when home price index increases.

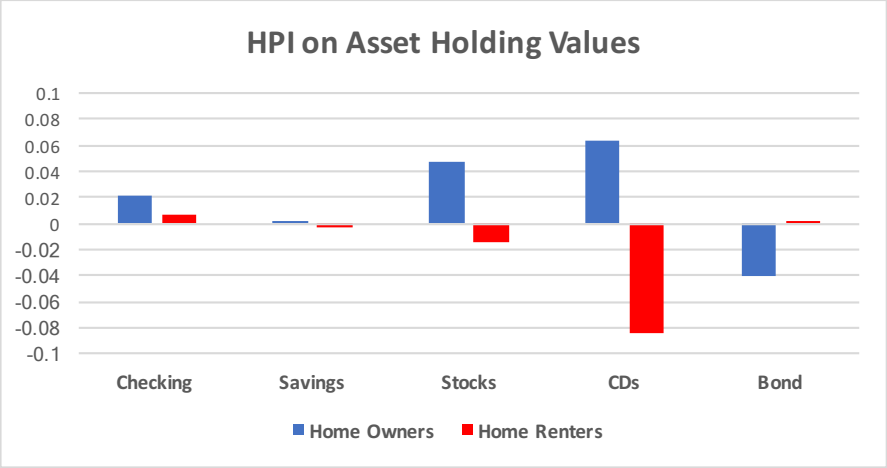

Figure 3:

Coefficients of HPI on asset holding values for homeowners and home renters

C. Predicting the percentage of one specific asset class in investor's portfolio

This research conducts five multivariate regressions for predicting how homeowners and home renters change the allocation percentage of each specific asset class given that this investor holds this asset class. The following chart also shows the coefficients of HPI and HPI+HouInt, which measures the impact of housing prices on home-renters (red bars) and homeowners (blue bars). When housing price increases, homeowners tend to increase the allocation percentage of Checking, Stocks, and CDs and decrease Savings and Bond. Home renters will decrease the percentages of all key asset classes except for Checking. Also, HouInt is only significant for Stocks

and Bond. As HPI increases by 10 points, homeowners increase the percentage of stocks by 2.42% and Bond by 2.09% while home renters decrease the percentage of stocks by 3.37% and Bond by 12.47%.

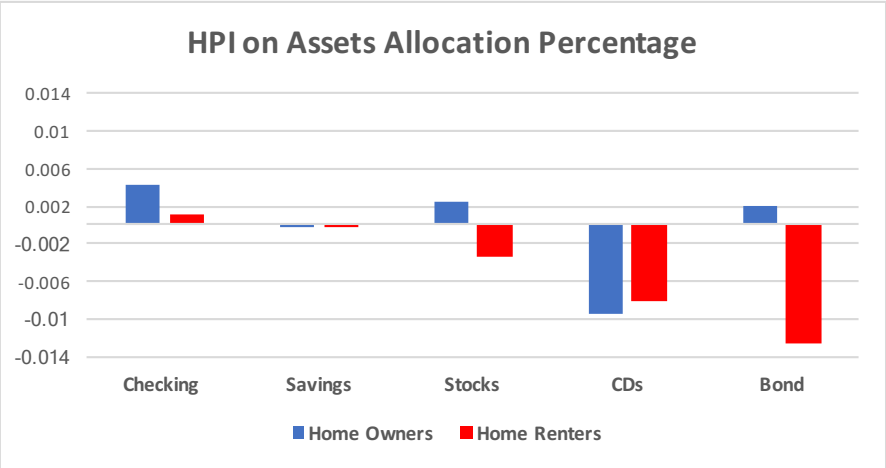

Figure 4:

Coefficients of HPI on assets allocation percentage for homeowners and home renters.

D. Summary for HouInt variable

This summary table shows the coefficients of HouInt in all of the fifteen regression tables. HouInt measures the different impact of HPI on homeowners relative to home renters. The column for significance level is determined by the p-value in one of the fifteen regression models. HouInt is significant for each asset class if the p-value is less than 0.05. The significance level column is labeled as "*" if the p-value if between 0.05 and 0.01, "**" if the p-value is between 0.01 and 0.001, and "***" if the p-value is less than 0.001.

Only Stocks have significance levels for all three measurements of asset allocations: participation probability, holding values, and allocation percentage. Checking, Savings and Certificate of Deposits have significance levels for participation probability and holding values, but not significant for allocation percentage. Bond has significance level regarding holding values and allocation percentage.

Financial Products	HouInt Estimate	P-Value	Significance Level
Participation Probability			
Checking	-0.00228	3.12E-14	***
Savings	0.00246	<2E-16	***
Stock	-0.00140	0.00056	***
Certificate of Deposits	0.00246	5.88E-08	***
Bond	0.00174	0.08418	
Holding Values			
Checking	0.01416	0.02260	*
Savings	0.00573	<2E-16	***
Stock	0.06185	0.00208	**
Certificate of Deposits	0.14664	2.35E-05	***
Bond	-0.04036	0.00725	**
Allocation Percentage			
Checking	0.00313	0.12930	
Savings	9.52E-05	0.36818	
Stock	0.00579	0.0232	*
Certificate of Deposits	-0.00154	0.55214	
Bond	0.01457	0.00345	**

XI. LIMITATION / FUTURE RESEARCH

1. More Geographical Information about Each Respondent

This research only uses the national-level housing price index since the geographical information of each survey respondent is only available in the internal version of the Survey of Consumer Finance datasets. If this research could acquire information about the census area each respondent comes from, each survey respondent in the Survey of Consumer Finance datasets could be assigned a housing price index based on the year and the geographical area to improve the accuracy of data analyses and coefficients of regression models.

2. More Family Characteristics as Control Variables

This research uses variables such as age, sex, number of children, income, etc. in the Survey of Consumer Finance datasets as control variables. More variables could be added into the regression models in order to see the impact of independent variables.

3. Finding More Non-Traditional Factors

Traditional asset allocation models only incorporate factors like investors' goal, time frame, risk tolerance, and etc. The main purpose of this research is finding non-traditional factors, such as home ownership and housing prices, that have an impact on asset allocation decisions and adding these non-traditional factors into existing models. Further research can dive deeply into the relationship between financial markets and other seemingly irrelevant areas to find more factors that drive different investment decisions.

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XIII. LIST OF REGRESSION TABLES

1. Probability of Having Checking Account

```
Call:
glm(formula = CheckingP ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, family = "binomial",
    data = Master_dataset_CSV)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.4534   0.4067   0.4795   0.6188   1.6573

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.3681917  0.0548442  -6.713 1.90e-11 ***
Age          0.0066757  0.0004641  14.383  < 2e-16 ***
Sex2         0.0475960  0.0177799   2.677  0.00743 **
Kids        -0.1030237  0.0051414 -20.038  < 2e-16 ***
MarSta2     -0.3575823  0.0170316 -20.995  < 2e-16 ***
Edu2         0.8064311  0.0168525  47.852  < 2e-16 ***
Edu3         1.2533631  0.0199107  62.949  < 2e-16 ***
Edu4         1.2262132  0.0178790  68.584  < 2e-16 ***
Labor1       0.2201076  0.0164823  13.354  < 2e-16 ***
LnIncome    -0.0264172  0.0040526  -6.519 7.10e-11 ***
HouOwner1    1.0646602  0.0398111  26.743  < 2e-16 ***
HPI          0.0043409  0.0002276  19.073  < 2e-16 ***
HouInt      -0.0022763  0.0002998  -7.593 3.12e-14 ***
```

2. Probability of Having Savings Account

```
glm(formula = SavingP ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, family = "binomial",
    data = Master_dataset_CSV)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.6865  -1.1130  -0.7857   1.1704   2.0957

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.1104477  0.0436641  -2.529   0.0114 *
Age         -0.0145570  0.0003586 -40.592  < 2e-16 ***
Sex2         0.1912286  0.0146178  13.082  < 2e-16 ***
Kids         0.0312765  0.0039752   7.868 3.61e-15 ***
MarSta2     -0.2732908  0.0134091 -20.381  < 2e-16 ***
Edu2         0.6015009  0.0159199  37.783  < 2e-16 ***
Edu3         0.7678873  0.0170355  45.076  < 2e-16 ***
Edu4         0.7281647  0.0158590  45.915  < 2e-16 ***
Labor1       0.1351419  0.0124593  10.847  < 2e-16 ***
LnIncome    -0.0446086  0.0027293 -16.344  < 2e-16 ***
HouOwner1    0.1754886  0.0334578   5.245 1.56e-07 ***
HPI          0.0011616  0.0002092   5.553 2.80e-08 ***
HouInt       0.0024643  0.0002457  10.029  < 2e-16 ***
```

3. Probability of Having Stocks

```
glm(formula = StocksP ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, family = "binomial",
    data = Master_dataset_CSV)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.7281  -0.6909  -0.3935   0.6665   3.8781

Coefficients:
             Estimate Std. Error  z value Pr(>|z|)
(Intercept) -8.3144671  0.0735172 -113.095  < 2e-16 ***
Age          0.0144532  0.0004864   29.715  < 2e-16 ***
Sex2        -0.4319737  0.0211652  -20.410  < 2e-16 ***
Kids        -0.0910991  0.0053623  -16.989  < 2e-16 ***
MarSta2      0.0174721  0.0176742    0.989 0.322876
Edu2         0.7060470  0.0294597   23.967  < 2e-16 ***
Edu3         1.1630318  0.0299360   38.851  < 2e-16 ***
Edu4         1.7468453  0.0282279   61.884  < 2e-16 ***
Labor1      -0.1075281  0.0164070   -6.554 5.61e-11 ***
LnIncome     0.4755730  0.0044599  106.632  < 2e-16 ***
HouOwner1    0.9023339  0.0532207   16.955  < 2e-16 ***
HPI         -0.0047513  0.0003753  -12.658  < 2e-16 ***
HouInt      -0.0013959  0.0004044   -3.451 0.000558 ***
```

4. Probability of Having Certificate of Deposits

```
glm(formula = CDSP ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, family = "binomial",
    data = Master_dataset_CSV)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.3360  -0.6251  -0.4641  -0.2844   2.8936

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -3.6018163  0.0722069 -49.882  < 2e-16 ***
Age          0.0280388  0.0005345  52.462  < 2e-16 ***
Sex2         0.2131303  0.0230529   9.245  < 2e-16 ***
Kids        -0.0602377  0.0063866  -9.432  < 2e-16 ***
MarSta2     -0.2878283  0.0207642 -13.862  < 2e-16 ***
Edu2         0.4757995  0.0248377  19.156  < 2e-16 ***
Edu3         0.5795891  0.0264951  21.875  < 2e-16 ***
Edu4         0.7423610  0.0243580  30.477  < 2e-16 ***
Labor1      -0.1665892  0.0167267  -9.959  < 2e-16 ***
LnIncome     0.0546230  0.0038653  14.132  < 2e-16 ***
HouOwner1    0.3843603  0.0569194   6.753 1.45e-11 ***
HPI         -0.0096968  0.0004213 -23.015  < 2e-16 ***
HouInt       0.0024572  0.0004532   5.422 5.88e-08 ***
```

5. Probability of Having Bond

```
glm(formula = BondP ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, family = "binomial",
    data = Master_dataset_CSV)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.6101  -0.3465  -0.1852  -0.0892   4.7500

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept) -1.110e+01  1.420e-01 -78.200  < 2e-16 ***
Age          3.703e-02  8.424e-04  43.954  < 2e-16 ***
Sex2         1.281e-01  3.996e-02   3.204 0.001353 **
Kids        -5.543e-02  9.265e-03  -5.983 2.18e-09 ***
MarSta2     -2.055e-01  3.208e-02  -6.405 1.50e-10 ***
Edu2         5.906e-01  6.037e-02   9.782  < 2e-16 ***
Edu3         1.140e+00  5.944e-02  19.186  < 2e-16 ***
Edu4         1.715e+00  5.567e-02  30.811  < 2e-16 ***
Labor1      -4.073e-01  2.420e-02 -16.830  < 2e-16 ***
LnIncome     6.021e-01  5.646e-03 106.643  < 2e-16 ***
HouOwner1    4.477e-01  1.153e-01   3.884 0.000103 ***
HPI         -1.925e-02  9.802e-04 -19.637  < 2e-16 ***
HouInt       1.741e-03  1.008e-03   1.727 0.084176 .
```

6. Holding Values of Checking Account

```
glm(formula = LnChecking ~ Age + Sex + Kids + MarSta + Edu +
    Labor + LnIncome + HouOwner + HPI + HouInt, data = Checking_Regression)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-8.6103  -0.8361   0.0214   0.8767   7.0275

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -2.4070592  0.4332993  -5.555 2.79e-08 ***
Age          0.0269255  0.0005949  45.261  < 2e-16 ***
Sex2        -0.3184436  0.0260145 -12.241  < 2e-16 ***
Kids        -0.1030652  0.0067299 -15.315  < 2e-16 ***
MarSta2      0.0927362  0.0232337   3.991 6.58e-05 ***
Edu2         0.2995744  0.0251402  11.916  < 2e-16 ***
Edu3         0.5878185  0.0272665  21.558  < 2e-16 ***
Edu4         0.7085229  0.0251406  28.182  < 2e-16 ***
Labor1      -0.1379106  0.0214562  -6.428 1.31e-10 ***
LnIncome     0.7013391  0.0061614 113.828  < 2e-16 ***
HouOwner1   -0.8649920  0.4776207  -1.811   0.0701 .
HPI          0.0071827  0.0055334   1.298   0.1943
HouInt       0.0141565  0.0062105   2.279   0.0226 *
```

7. Holding Values of Savings Account

```
glm(formula = LnSavings ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = Saving_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-11.0782   -1.2058    0.1724    1.3839   12.6083

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.3712767  0.0733427   5.062 4.15e-07 ***
Age          0.0324777  0.0005471  59.358  < 2e-16 ***
Sex2        -0.4915093  0.0227034 -21.649  < 2e-16 ***
Kids        -0.0725835  0.0058503 -12.407  < 2e-16 ***
MarSta2      0.0031547  0.0209580   0.151    0.880
Edu2         0.4010454  0.0265830  15.087  < 2e-16 ***
Edu3         0.6186872  0.0278601  22.207  < 2e-16 ***
Edu4         1.2056041  0.0261771  46.056  < 2e-16 ***
Labor1      -0.0174774  0.0200316  -0.872    0.383
LnIncome     0.4913354  0.0047031 104.471  < 2e-16 ***
HouOwner1    0.0303471  0.0526906   0.576    0.565
HPI         -0.0036035  0.0003361 -10.721  < 2e-16 ***
HouInt       0.0057270  0.0003874  14.782  < 2e-16 ***
```

8. Holding Values of Stocks

```
glm(formula = LnStocks ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = Stocks_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-10.2839   -1.1933    0.1493    1.3166    8.4216

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -4.065313   1.484559  -2.738  0.00618 **
Age          0.046259   0.001404  32.944  < 2e-16 ***
Sex2        -0.411094   0.068399  -6.010 1.89e-09 ***
Kids        -0.094356   0.016107  -5.858 4.77e-09 ***
MarSta2      0.549994   0.053211  10.336  < 2e-16 ***
Edu2         0.243285   0.086769   2.804  0.00506 **
Edu3         0.466739   0.086665   5.386 7.32e-08 ***
Edu4         0.819645   0.080242  10.215  < 2e-16 ***
Labor1      -0.506034   0.046431 -10.899  < 2e-16 ***
LnIncome     1.072924   0.011508  93.232  < 2e-16 ***
HouOwner1   -4.519267   1.541493  -2.932  0.00338 **
HPI         -0.013793   0.019203  -0.718  0.47262
HouInt       0.061847   0.020082   3.080  0.00208 **
```

9. Holding Values of Certificates of Deposits

```
glm(formula = LnCDS ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = CDS_Regression)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-5.9659  -0.9469   0.0061   0.9651   5.2024

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.9402092  1.0895547   0.863  0.38819
Age          0.0256710  0.0012413  20.681  < 2e-16 ***
Sex2         0.0922668  0.0560175   1.647  0.09956 .
Kids        -0.1257029  0.0150842  -8.333  < 2e-16 ***
MarSta2      0.1078346  0.0500611   2.154  0.03126 *
Edu2         0.0229587  0.0493927   0.465  0.64207
Edu3        -0.0695384  0.0540748  -1.286  0.19848
Edu4        -0.1309766  0.0484174  -2.705  0.00684 **
Labor1      -0.3312835  0.0396667  -8.352  < 2e-16 ***
LnIncome     0.7059152  0.0112977  62.483  < 2e-16 ***
HouOwner1    3.2663628  1.1510574   2.838  0.00455 **
HPI          0.0007185  0.0140300   0.051  0.95915
HouInt      -0.0403645  0.0150303  -2.686  0.00725 **
```

10. Holding Values of Bond

```
glm(formula = LnBond ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = Bond_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-10.9022   -1.0530    0.1048    1.1426    6.4996

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  4.295656   2.587805   1.660   0.0970 .
Age          0.031663   0.001889  16.759  < 2e-16 ***
Sex2        -0.116927   0.094857  -1.233   0.2177
Kids        -0.027007   0.022538  -1.198   0.2308
MarSta2      0.327410   0.073694   4.443 9.00e-06 ***
Edu2        -0.541010   0.129723  -4.171 3.07e-05 ***
Edu3         0.061879   0.125548   0.493   0.6221
Edu4        -0.034511   0.115576  -0.299   0.7653
Labor1      -0.360814   0.053969  -6.686 2.46e-11 ***
LnIncome     0.969256   0.014063  68.923  < 2e-16 ***
HouOwner1  -10.715169   2.635936  -4.065 4.85e-05 ***
HPI         -0.083240   0.033803  -2.462   0.0138 *
HouInt       0.146635   0.034653   4.232 2.35e-05 ***
```

11. Allocation Percentage of Checking Account

```
glm(formula = CheckingPer ~ Age + Sex + Kids + MarSta + Edu +
    Labor + LnIncome + HouOwner + HPI + HouInt, data = Checking_Regression)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-0.5853  -0.1863  -0.1084   0.0143   9.7088

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.7110646  0.1441747   4.932 8.17e-07 ***
Age         -0.0020968  0.0001979 -10.593  < 2e-16 ***
Sex2        -0.0306469  0.0086560  -3.541   0.0004 ***
Kids         0.0160734  0.0022393   7.178 7.19e-13 ***
MarSta2      0.0756225  0.0077307   9.782  < 2e-16 ***
Edu2        -0.1329793  0.0083651 -15.897  < 2e-16 ***
Edu3        -0.1674048  0.0090726 -18.452  < 2e-16 ***
Edu4        -0.1920259  0.0083652 -22.955  < 2e-16 ***
Labor1      -0.0291734  0.0071393  -4.086 4.39e-05 ***
LnIncome    -0.0186521  0.0020501  -9.098  < 2e-16 ***
HouOwner1   -0.3798499  0.1589221  -2.390   0.0168 *
HPI          0.0012166  0.0018412   0.661   0.5088
HouInt       0.0031349  0.0020665   1.517   0.1293
```

12. Allocation Percentage of Savings Account

```
glm(formula = SavingsPer ~ Age + Sex + Kids + MarSta + Edu +
    Labor + LnIncome + HouOwner + HPI + HouInt, data = Saving_Regression)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-0.6093  -0.1983  -0.1277   0.0577   9.7790

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.763e-01  2.003e-02  33.766  < 2e-16 ***
Age         -1.156e-03  1.494e-04  -7.733 1.06e-14 ***
Sex2        -1.709e-02  6.201e-03  -2.756  0.00585 **
Kids         1.010e-02  1.598e-03   6.318 2.66e-10 ***
MarSta2      4.659e-02  5.724e-03   8.139 4.02e-16 ***
Edu2        -1.028e-01  7.260e-03 -14.153  < 2e-16 ***
Edu3        -1.496e-01  7.609e-03 -19.663  < 2e-16 ***
Edu4        -1.530e-01  7.149e-03 -21.397  < 2e-16 ***
Labor1      -7.937e-02  5.471e-03 -14.507  < 2e-16 ***
LnIncome    -8.785e-03  1.284e-03  -6.840 7.98e-12 ***
HouOwner1   -1.193e-01  1.439e-02  -8.290  < 2e-16 ***
HPI         -1.128e-04  9.180e-05  -1.229  0.21921
HouInt       9.522e-05  1.058e-04   0.900  0.36818
```

13. Allocation Percentage of Stocks

```
glm(formula = StockPer ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = Stocks_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-0.45309  -0.18946  -0.08526   0.13859   0.80009

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.3910891  0.1885324   2.074   0.0381 *
Age          0.0010778  0.0001783   6.044 1.54e-09 ***
Sex2        -0.0572656  0.0086864  -6.593 4.45e-11 ***
Kids        -0.0035621  0.0020455  -1.741   0.0816 .
MarSta2      0.0743613  0.0067575  11.004  < 2e-16 ***
Edu2        -0.0782865  0.0110192  -7.105 1.26e-12 ***
Edu3        -0.0754851  0.0110060  -6.859 7.20e-12 ***
Edu4        -0.0874611  0.0101904  -8.583  < 2e-16 ***
Labor1      -0.0457173  0.0058965  -7.753 9.46e-15 ***
LnIncome     0.0166041  0.0014615  11.361  < 2e-16 ***
HouOwner1   -0.4797855  0.1957628  -2.451   0.0143 *
HPI         -0.0033662  0.0024387  -1.380   0.1675
HouInt       0.0057907  0.0025503   2.271   0.0232 *
```

14. Allocation Percentage of Certificates of Deposits

```
glm(formula = CDSPer ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = CDS_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-0.59732  -0.17067  -0.06375   0.15198   0.94899

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.5766930  0.1874259   8.412  < 2e-16 ***
Age          0.0008315  0.0002135   3.894 9.91e-05 ***
Sex2         0.0369354  0.0096362   3.833 0.000127 ***
Kids         0.0065480  0.0025948   2.524 0.011632 *
MarSta2      0.0284518  0.0086115   3.304 0.000956 ***
Edu2        -0.0938126  0.0084966 -11.041  < 2e-16 ***
Edu3        -0.1694964  0.0093020 -18.222  < 2e-16 ***
Edu4        -0.2006073  0.0083288 -24.086  < 2e-16 ***
Labor1      -0.0336857  0.0068235  -4.937 8.06e-07 ***
LnIncome    -0.0445921  0.0019434 -22.945  < 2e-16 ***
HouOwner1    0.0643453  0.1980057   0.325 0.745212
HPI         -0.0079829  0.0024134  -3.308 0.000944 ***
HouInt      -0.0015373  0.0025855  -0.595 0.552136
```

15. Allocation Percentage of Bond

```
glm(formula = BondPer ~ Age + Sex + Kids + MarSta + Edu + Labor +
    LnIncome + HouOwner + HPI + HouInt, data = Bond_Regression)

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-0.45913  -0.18533  -0.07676   0.12952   0.79547

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.8677406  0.3718971   2.333  0.01966 *
Age          0.0013962  0.0002715   5.142 2.78e-07 ***
Sex2         0.0051175  0.0136320   0.375  0.70737
Kids         0.0090342  0.0032390   2.789  0.00530 **
MarSta2      0.0430133  0.0105907   4.061 4.93e-05 ***
Edu2        -0.0811942  0.0186427  -4.355 1.35e-05 ***
Edu3        -0.0072469  0.0180427  -0.402  0.68795
Edu4        -0.0755763  0.0166095  -4.550 5.44e-06 ***
Labor1      -0.0335380  0.0077559  -4.324 1.55e-05 ***
LnIncome     0.0256011  0.0020210  12.668  < 2e-16 ***
HouOwner1   -1.0989292  0.3788141  -2.901  0.00373 **
HPI         -0.0124726  0.0048579  -2.567  0.01026 *
HouInt       0.0145671  0.0049800   2.925  0.00345 **
```